METTLER TOLEDO

Xpress™

Operation and Service Manual

METTLER TOLEDO
XRM Price Computing Scale

About this manual and METTLER TOLEDO Xpress

Thank you for purchasing a METTLER TOLEDO Xpress product.

All of our equipment is assembled and packed with great care. If you should find any incorrect item, please contact your METTLER TOLEDO Xpress dealer immediately.

The XRM Price Computing Scale is a Weights & Measures approved precision weighing instrument. However, you may want to obtain official certification through your supplier or local Weights & Measures office.
This METTLER TOLEDO Xpress product was developed, produced, and tested in a METTLER TOLEDO facility that has been audited and registered according to international ISO 9001 quality standards and ISO 14000 environment control program. Properly used and maintained, this product will provide years of accurate weighing.

Handle it as you would any piece of fine electronic equipment. Please **read** this manual **before** operating or servicing this equipment. Follow the instructions carefully and save this manual for future reference. We at METTLER TOLEDO Xpress want to make sure you received the product you expected. It is important to us that you are satisfied with your purchase. If there is anything we can help you with, or if you are not satisfied with either your product or the services received from the METTLER TOLEDO Xpress representative, let us know.

How can you reach us?

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1 Safety notice

▲ Read this manual before operating or servicing the scale. Save this manual for future reference.

▲ Do not allow untrained personnel to operate, clean, inspect, maintain, service or tamper with the scale.

▲ Observe safety warnings located throughout this manual.

DANGER!
Electric shock hazard!

➜ Always disconnect all power before working on the scale.

CAUTION!
Damage to the scale!

➜ The scale may only be opened by qualified personnel, otherwise the warranty is void.

➜ Exercise care when moving, testing or adjusting the scale.

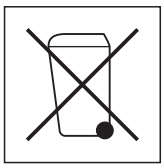
CAUTION!
Damage to the scale!

➜ Handle the scale with care. It is a precision instrument.

➜ When the platform has been removed, never clean the area under the platform with a solid object.

➜ Do not put excessive loads on the scale.

➜ Avoid banging the platform.



Disposal

➜ Observe the valid environmental regulations when disposing of the scale.

Batteries contain heavy metals and therefore must not be disposed of with normal waste.

➜ Observe the local regulations for disposing of environmentally hazardous materials.

2 Preparing your scale for use

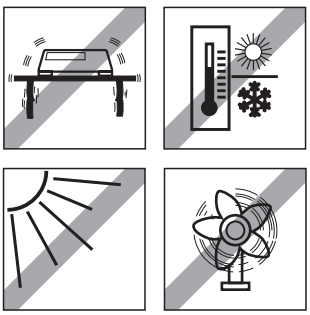
2.1 Unpacking

➜ Ensure that all parts are accounted for:

Contents

- XRM price computing scale
- Platform
- AC-DC power adapter
- Lead-acid battery (option)
- Quick Start Guide
- Installation Instructions
- CD-ROM with Operation and Service Manual

2.2 Selecting or changing the location



The correct location is crucial to the accuracy of the weighing results.

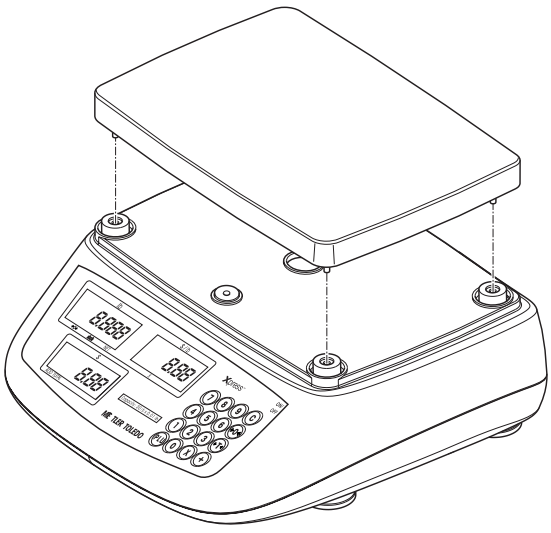
➜ Select a stable, vibration-free and if possible a horizontal location.

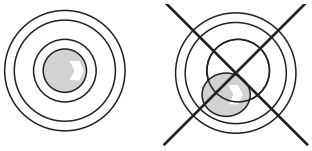
The ground must be able to safely hold the weight of the fully loaded scale.
Observe the following environmental conditions:

- No direct sunlight
- No strong drafts
- No excessive temperature fluctuations

2.3 Assembling

➜ Put the platform on the spider (aluminum plate). Ensure that the platform is properly aligned.





Leveling the scale

Only scales that have been leveled precisely horizontally provide accurate weighing results. The scales have a spirit level to simplify leveling.

➜ Turn the adjustable feet of the scale until the spirit level's air bubble is inside the inner circle.

Major geographical location changes

The manufacturer adjusts each scale to the local gravity conditions (GEO value). In the event of major geographical location changes, this setting must be adjusted. Certified scales must also be recertified observing the national certification regulations.

2.4 Power supply

The scale can be operated with the AC adapter provided or with batteries.

CAUTION!

Damage to the scale.

➜ Allow the scale to adjust to room temperature before connecting the power supply.

2.4.1 External AC adapter

➜ Connect the scale to a power outlet of appropriate voltage and frequency using the adapter provided.

2.4.2 D-cell batteries

You can use D-cell batteries of size UM1. Batteries are not provided with the scale.

CAUTION!

Risk of explosion!

➜ Never replace batteries of an incorrect type.

➜ Always install the batteries as shown on the battery holder.

➜ Dispose of used batteries according to local laws and regulations.

Installing/changing D-cell batteries

1. Make sure that the external power supply is disconnected.
2. Turn the scale upside down and lay the scale carefully on the platform.
3. Open the battery cover by pressing the 2 buttons.
4. Install the batteries as shown on the battery holder. Make sure that all 6 batteries have the same capacity.
5. Close the cover by just putting it back and pressing it to the right location.

2.5 Switching scale on and off

2.5.1 Switching on

Prerequisite
Before switching on the scale make sure that there is no weight on the platform.

➜ Press ⏻ to switch on the scale.

The scale goes through a series of self-tests.

When all displays show 0 the scale is ready for operation.

Notes

- The scale should have been running for about 15 minutes prior to operation.
- If the scale does not automatically zero upon power up, ensure that the platform is properly leveled and/or recalibrate the scale, see page 19.

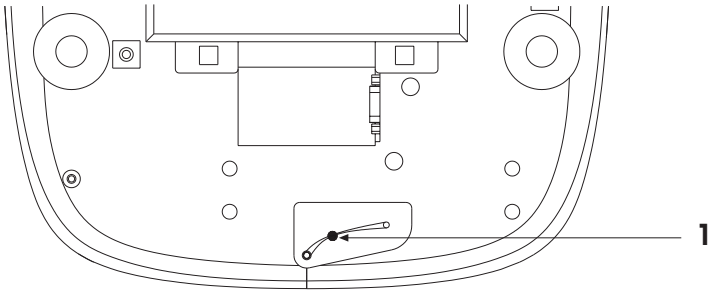
2.5.2 Switching off

➜ Press and hold ⏻ until in the weight display "OFF" is shown.

2.6 Sealing

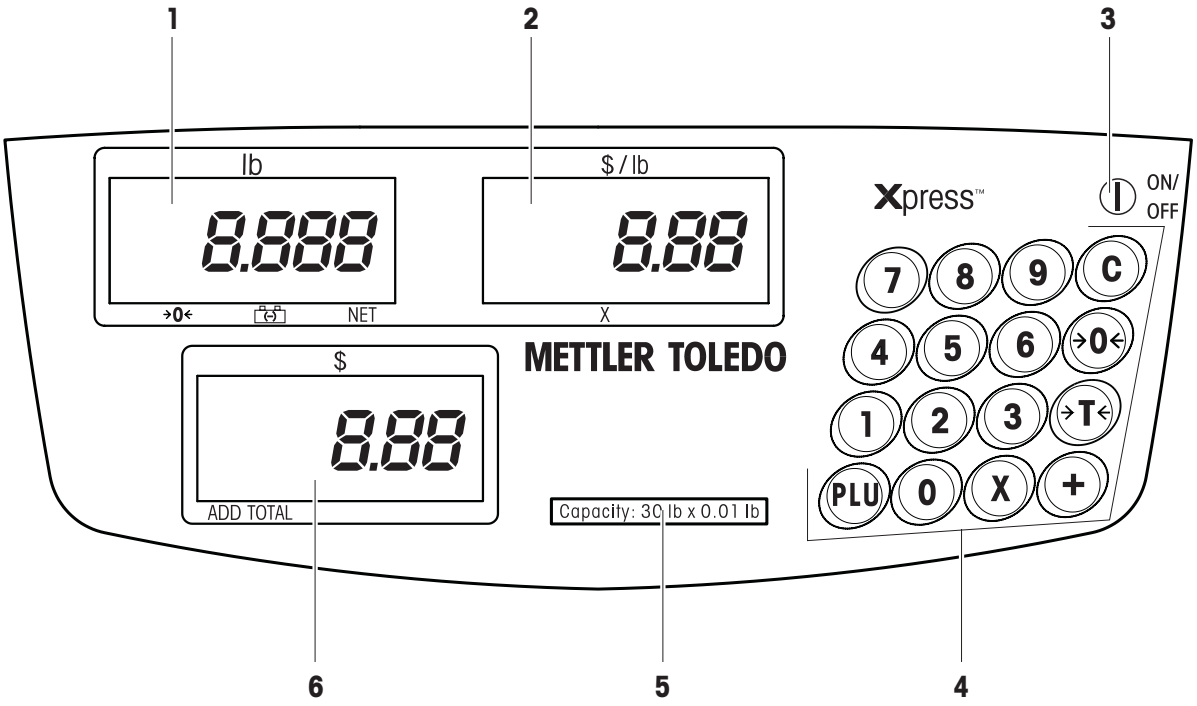
After installation is complete, most legal-for-trade applications require sealing the enclosure so settings cannot be changed. **Please contact your authorized METTLER TOLEDO Xpress dealer to seal your scale.**

1. Install 2 special through-hole sealing screws and tighten them.
2. Run a wire seal (1) through the holes in the heads of the screws.
3. Apply the seal.



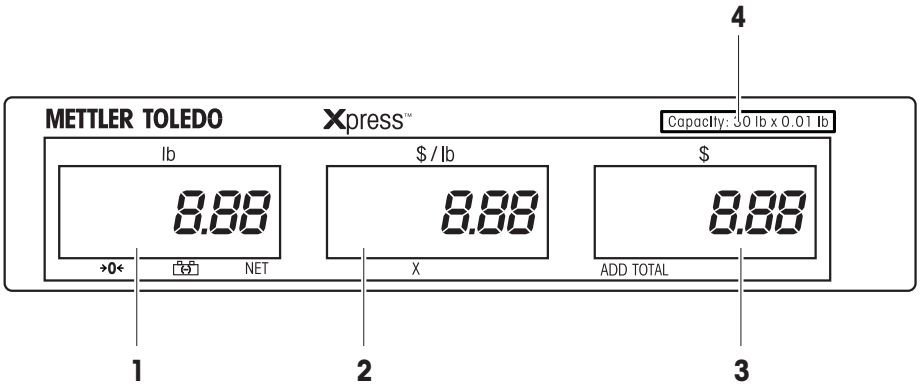
3 The XRM price computing scale at a glance

3.1 Operating field



1 Weight display
2 Unit price display
3 ON/OFF key
4 Keypad
5 Weights & Measures marking
6 Total price display

3.2 Customer display



1 Weight display

2 Unit price display

3 Total price display

4 Weights & Measures marking

3.3 Cursors

Cursor	**The cursor lights when...**
>0<	the gross weight is zero
(-)	the battery is full or power source is the AC adapter
	the scale is powered by battery if the cursor is blinking: battery needs to be changed
NET	the current weight is the net weight
X	the current pricing way is by-count
ADD/ACUM	a transaction has been accumulated
TOTAL	the current display is in accumulation mode

3.4 Keyboard

Key	Name	Function
	ON/OFF key	Switching scale on and off
0 … 9	Numeric keys	Enter unit price, tare and other data
	Clear key	Clear the input via the keyboard or the accumulation display
	Zero key	Setting scale to gross zero
	Tare key	Tare the container weight
	PLU key	Store or recall a PLU
	By-count key	Activate by-count operation
	Accumulation key	Accumulate current transaction

4 Operating your scale

Note
Not all functions are available on all models. Please check with your dealer which functions are available on your scale.

4.1 Zeroing

For best weighing results set the empty scale to zero before weighing.

4.1.1 Zeroing when switching on

The scale is automatically set to zero when it is switched on.
The zero setting range is ±10 % of the scale capacity.
If there is a weight on the scale more than +10 % or less than −10 % the scale will not be set to zero and the weight display shows "-----".

➜ Remove the weight and/or make sure that the platform is free.

The scale is zeroed.

4.1.2 Pushbutton zero

Setting to zero with →0← is only possible if

- the displayed weight value is within ±2 % of the scale capacity,
- the scale is in gross weighing mode, i.e. the NET cursor must be off,
- the scale is not in motion, i.e. the motion cursor must be off.

➜ Press →0←.

The weight display is set to zero.

4.2 Taring

Taring subtracts the weight of the container or wrapping material.
Depending on the setting of the scale configuration service mode, see page 19, you can either tare with the tare key (pushbutton tare) or enter the tare value on the keyboard (keyboard tare).

4.2.1 Pushbutton tare

1. Place the empty container or wrapping material on the platform.
2. Press →T←.

   The weight display is set to zero and the NET cursor is lit.

4.2.2 Keyboard tare

When you know the tare weight of the container, you don't have to weigh and tare the empty container. You can enter the tare weight on the keyboard.

1. Enter the known tare value on the keyboard.
2. Press →T←.

   The weight display shows the input tare weight with negative sign and the NET and PT cursors are lit.

Recalling keyboard tare

1. When the PT cursor is lit, press →T←.

   The tare weight is displayed in the weight field and the PT cursor is lit in the unit price field.

2. Press →T← again to return to normal weighing mode.

Clearing keyboard tare

➜ When the unit price is zero, press C to clear the keyboard tare.

Note

The tare value entered should be a multiple of the minimum incremental value, otherwise it will be rounded to the next nearest increment.
Example: If the increment is 0.005 kg and the input value is 0.401, the keyboard tare will be 0.400 kg, although the display may show 0.401 during data entry.

4.3 Weighing and pricing

1. Place the item to be weighed on the platform.
2. Enter the price per unit, max. 6 digits.

   The weight and the price of the item are displayed.

3. Remove the item from the platform.

   In all 3 display fields 0 is shown.

4.4 By-count operation

With this function you can compute the price for non-weighing items, e.g. the price for 36 pieces when 3 pieces cost 1.48.

1. Enter the deal quantity (1-99), e.g. 3, and press (X).
2. Enter the deal price, e.g. 1.48, and press (+).

   The by-count cursor is lit.
3. Enter the quantity to be sold, e.g. 36.

   The scale displays the total price.

Ending by-count operation

➜ Press (C) to get back to normal weighing mode.

4.5 PLU function (Price Look Up)

The PLU function can be used for frequently sold goods. The price can be looked up by simply entering the PLU number.
The PLU function can store 25 PLUs.

4.5.1 Storing a PLU

1. Perform a pricing transaction as described above.
2. Press and hold (PLU) until two beeps are heard.

   In the weight display PLU appears.
3. Enter the PLU number (1-25).

   The scale beeps twice again, indicating that the PLU has been stored.

4.5.2 Recalling a PLU

1. Place the item to be weighed on the platform.
2. Press (PLU) and enter the desired PLU number.

   The selected PLU will be recalled from the memory.
3. Remove the item from the platform.

   In all 3 display fields 0 is shown.

4.6 Accumulation function

With the accumulation function you can add the total prices of several weighings to the accumulated total.

1. Perform a pricing transaction as described above.
2. Press (+).

   The total price is added to the accumulated total and the cursors "TOTAL" and "ADD" or "ACCUM." are lit.
   The weight field shows "TOTAL", the unit price field shows the number of accumulations; and the total price field shows the acumulated total price.
3. Repeat the above steps 1 and 2 until all desired transactions are finished.
   The scale must return to zero before the next item can be accumulated.

Finishing the accumulation function

➜ Press (C) to clear the accumulator and return to normal weighing mode.

Notes
If in setup mode communicaton is set to "Data output via + key", accumulation is not possible.

4.7 Backlight function

The scale is equipped with a backlight for the display in case the light of the environment is not bright enough to read the display.

Enabling backlight function

➜ Press and hold (C) until a long beep is heard.

2 more beeps indicate that the backlight has been switched on.

If the scale is idle for 2 minutes, the backlight will automatically switch off.
When a weight is placed on the platform or when a key is pressed, the backlight will light up again.

Disabling backlight function

➜ Press and hold (C) until a long beep is heard.

2 more beeps indicate that the backlight has been switched off.

– or –

➜ Switch the scale off and on.

4.8 Power saving feature

This feature is used to save battery power.
When battery powered and the scale is idle for 2 minutes, both the price and the total price displays will turn off. The weight display will only display one 0, and the battery in use cursor is lit.
If there is still no key operation and weight change after power saving status was activated, the scale shuts down automatically.

Waking up the scale from power saving mode

➜ Press a key or put a weight on the scale.

The display lights up.

– or –

➜ Press ⏻ to switch on the scale.

Note
The power saving feature can be enabled or disabled in the setup mode, see page 17.

4.9 Battery operation

When the scale is battery powered, the battery cursor indicates the state of the battery.

🔋		Battery is full or power source is the AC adapter
🔋		Battery operation
🔋	blinking	Battery needs to be changed

Notes
If the scale is connected to a power outlet via the AC adapter, the power source will automatically switch to the AC adapter.
If the AC power is off, the power source will automatically switch to battery power source.

4.10 Cleaning

CAUTION!
Damage to the scale.

➜ Do not use any type of industrial solvents or chemicals.

Cleaning

➜ Clean the keybord and the display with a soft cloth that has been dampened with a mild window type cleaner or detergent.

5 Setup mode

In the setup mode you can customize parameters to suit your specific needs.

5.1 Operating the setup mode

5.1.1 Entering the setup mode

➜ When switching on the scale press and hold (C) until "grP 1" is displayed.

5.1.2 Displays in the setup mode

The setup mode parameters are arranged in groups and steps.
The displays show the following:

Weight display	Group number
Unit price display	Step number
Total price display	Selected setting of the step

5.1.3 Keys and their function in the setup mode

(→T←) Toggle between available parameters

(→0←) Back to the last step

(+) Next step

(C) End setup mode

5.1.4 Ending the setup mode

1. Press (C).
   Scale configuration is ended and "SAVE" is displayed.
2. Press (+) to save the changes.

– or –

3. Press (→T←) to discard the changes.

5.2 Setup mode functions

The parameters of the setup mode are combined in groups. The groups and parameters are numbered.
Default settings are printed in **bold.**

No.	Function	Explanation
1.3	Beeper	**ON** Scale will **beep** when a key is pressed OFF No sound when a key is pressed
1.4	Automatic power off	**ON** Automatic power off **enabled** OFF Automatic power off disabled
1.6	Automatic clearing of tare and unit price	**ON** Automatic clearing of tare weight and unit price when the weight is removed from the platform OFF Manual clearing of tare weight and unit price
2.7	Data output	**0** Data output via **P command** from PC or printer 1 Data output via + key 2 Stable output 3 Continuous output 4 Data output via W command from PC or printer
2.8	Content of output	0 Weight only 1 Weight and unit price or weight and item number **2** **Weight** and **unit price** and **total price**
2.9	Content of entry	ON Entry of item number. Price computing function is disabled. **OFF** Entry of unit price
2.10	Multi-line output format	ON Multi-line **OFF** **Single line**
3.1	Digital filter	The digital filter stabilizes the weight display when the load is moving or vibrating 0 Light filter **1** **Middle** filter 2 High filter

6 Servicing your scale

CAUTION!
Damage to the scale!

➜ The scale may only be serviced by qualified personnel, otherwise the warranty is void.

➜ For the following services, please contact your METTLER TOLEDO Xpress dealer.

The scale has 3 different modes for service functions:

- Scale configuration service mode – to adjust the scale to each country's requirements
- Calibration service mode – to enter GEO value and to perform calibration
- High resolution display service mode – to check the accuracy of the scale

Notes

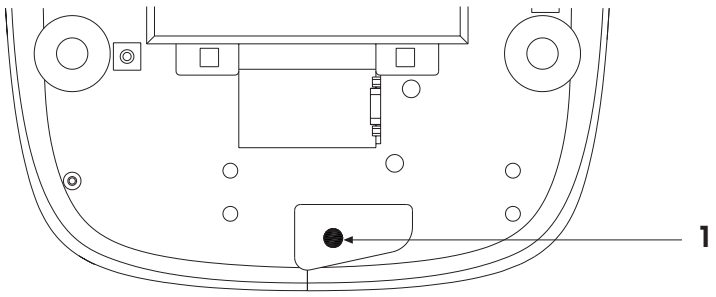
- These functions are directly related to the Weights & Measures regulations of each country. Therefore they are protected by the calibration switch, which is protected by a sealing sticker or sealing lead.
- Operation in the service modes is the same as in setup mode.

WARNING!
Damage to the scale or bodily harm!

➜ Before connecting or disconnecting any internal electronic components or interconnecting wiring between electronic equipment, always remove power and wait at least 30 seconds before any connections or disconnections are made.

6.1 Switching calibration switch to ON

1. Undo sealing sticker or sealing lead from the sealing screw.
2. Remove the sealing screw (1).
3. Press the switch in the hole.



The weight display shows "grP 1".

6.2 Scale configuration service mode

6.2.1 Entering scale configuration service mode

➜ With the calibration switch set to ON, press the following keys: PLU 5 5 5 5 5.

6.2.2 Scale configuration service mode functions

The parameters of the scale configuration service mode are numbered.
Default settings for the US are printed in **bold.**

6.3 Calibration service mode

Step	Function	Settings / Explanation
1.1	Country selection	With the country selection the following parameters are set automatically: Geo value, weight unit, zero cursor, currency, price format, decimal point or decimal comma. PrC People's Republic of China uSA United States Sri L Sri Lanka LAtin Latin America AU Australia D Germany EU France
1.2	Reset	YES Reset scale configuration parameters to country default settings. These settings meet the Weights & Measures requirements of the selected country. If other settings are made, the scale can no longer be used in commercial environments. **NO** Do not reset parameters
1.5	Decimal places for price	0 No decimal places 1 1 decimal place **2** **2** decimal places 3 3 decimal places
1.7	Expanded weight display	ON Minor weight increments (0.1 d) are displayed **OFF** Weight ist displayed in normal display increments
2.1	Tare	**ON** Tare function **enabled** OFF Tare function disabled
2.2	Chain tare	**ON** Chain tare or multiple tares **enabled** OFF Only 1 tare per transaction allowed
2.3	Keyboard tare	**ON** Tare can be entered via the **numeric keyboard** OFF The weight on the platform becomes the tare weight when the TARE key is pressed
2.4	Accumulation	**ON** Accumulation **enabled** OFF Accumulation disabled

Step	Function	Settings / Explanation
2.5	Round total price	ON Total price will be rounded up or down to 0 or 5 **OFF** Total price not rounded
3.2	Weight unit	kg **lb**
3.3	Geo value	0 ... 31 Possible settings **12** **Factory setting**

6.3.1 Entering calibration service mode

➜ In step 3.4 select YES to enter calibration service mode.

CAL is shown in the weight display.
The step number of the calibration procedure is shown in the unit price display.
Parameter settings are shown in the total price display.

6.3.2 Calibration procedure

Weight display	Unit price display	Total price display	Press key(s)	Description
CAL	Step 1	15 / 30 – or – 6 / 15	→T← – and/or – +	Select the scale capacity: 15 lb or 30 lb if weight unit is lb 6 kg or 15 kg if weight unit is kg
CAL	Step 2	------		Clear the platform
			+	Initiate zero reading
		5 ... 0		Zero reading is being taken If motion is detected, the count resets to 5 and resumes counting
CAL	Step 3	++++++		Load the appropriate test weight for span reading (min. 50 % of scale capacity)
			+	Confirm test weight
CAL	Step 4	0	0 ... 9	Enter test weight value
		e.g. 15 (kg)	+	Confirm test weight value
		5 ... 0		Span reading is being taken If motion is detected, the count resets to 5 and resumes counting
SAVE			+	Save your changes and initiate a power-up sequence
			– or – →T← +	Leave service mode without saving changes and initiate a power-up sequence

7 Appendix

7.1 Error messages

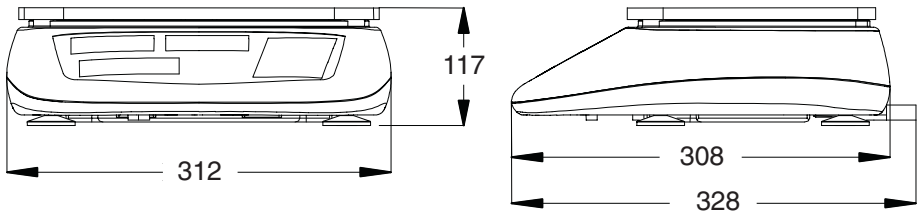
Error Code	Fault	Remedy
E11	RAM error	➜ Call METTLER TOLEDO Xpress service
E16	ROM error	➜ Call METTLER TOLEDO Xpress service
E18	EEPROM error	➜ Call METTLER TOLEDO Xpress service
E31	By-count operation error	➜ Enter up to 2 digits of item quantity
E33	Number of transactions > 99	➜ Finish accumulation and start a new one
E34	PLU number > 25	➜ Enter correct PLU number (1 ... 25)
No PLU	PLU not found	➜ Store PLU
Weight display:	Underload, i.e. weight below zero limit	➜ Set the scale to zero ➜ Load scale ➜ Switch scale off and then on again ➜ If message is still on, call METTLER TOLEDO Xpress service
Weight display:	Overlaod	➜ Decrease load
Price display:	Price > 9999.99	➜ Decrease load

7.2 Technical data

7.2.1 General technical data

Display	• LCD with 12 mm high characters and backlighting • 5 characters for weight, 6 characters for unit price and 6 characters for total price – or – • LED with 14 mm high characters and backlighting • 5 characters for weight, 5 characters for unit price and 6 characters for total price
Keyboard	• 17-point membrane keyboard • Tactile and tone feedback upon pressing the key
Enclosure	• Plastic top and bottom covers • Die-casting spiders
Platform	• Stainless steel
Power consumption	• 45.8 mA without backlighting • 72.5 mA with backlighting
Power supply	Alternatively • External 12 VDC / 800 mA power supply • 6 D-cells size UM1
Ambient conditions for operation	• 5 °C ... +40 °C / 41 °F ... 104 °F • Relative humidity 10 % ... 85 %, non condensing
Storage conditions	• 0 °C ... +70 °C / 32 °F ... 158 °F • Relative humidity 10 % ... 85 %, non condensing
(Shipping) weight	• 4.8 kg / 10.0 lb (without battery)
Weights & Measures approvals	• NTEP

Dimensions



Dimensions in mm

7.2.2 Weighing data

Capacity	3 kg	6 lb	6 kg	15 lb	15 kg	30 lb	30 kg	60 lb
2/3 capacity	2 kg	4 lb	4 kg	10 lb	10 kg	20 lb	20 kg	40 lb
Verified resolution	0.001 kg	0.002 lb	0.002 kg	0.005 lb	0.005 kg	0.01 lb	0.01 kg	0.02 lb
Display resolution	0.001 kg	0.002 lb	0.002 kg	0.005 lb	0.005 kg	0.01 lb	0.01 kg	0.02 lb

7.3 FCC notice

This device complies with Part 15 of the FCC Rules and the Radio Interference Requirements of the Canadian Department of Communications. Operation is subject to the following conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

WARNING

This equipment generates, uses and can radiate radio frequency energy and if not installed and used properly, i.e., in accordance with the user manual, may cause harmful interference to radio communications. It has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause harmful interference to radio communications in which case the user will be required to correct the interference at his or her own expense.

7.4 Notes on Weights & Measures

The METTLER TOLEDO Xpress XRT price computing scale meets the requirements of the National Institute of Standards and Technology, Handbook 44.
Local Weights and Measures authorities may have regulations regarding the use of weighing devices in commercial applications. In all cases, Weights and Measures require that a scale be approved and sealed prior to commercial use.
Contact your local Weights and Measures authorities prior to use.

7.5 Geo value table

Note

Geo values on this chart are accurate up to an altitude of 2000 m.

Northern and southern latitude in degrees and minutes	Height above sea-level in meters										
	0 325	325 650	650 975	975 1300	1300 1625	1625 1950	1950 2275	2275 2600	2600 2925	2925 3250	3250 3575
	Height above sea-level in feet										
	0 1060	1060 2130	2130 3200	3200 4260	4260 5330	5330 6400	6400 7460	7460 8530	8530 9600	9600 10660	10660 11730
0° 0′ – 5° 46′	5	4	4	3	3	2	2	1	1	0	0
5° 46′ – 9° 52′	5	5	4	4	3	3	2	2	1	1	0
9° 52′ – 12° 44′	6	5	5	4	4	3	3	2	2	1	1
12° 44′ – 15° 6′	6	6	5	5	4	4	3	3	2	2	1
15° 6′ – 17° 10′	7	6	6	5	5	4	4	3	3	2	2
17° 10′ – 19° 2′	7	7	6	6	5	5	4	4	3	3	2
19° 2′ – 20° 45′	8	7	7	6	6	5	5	4	4	3	3
20° 45′ – 22° 22′	8	8	7	7	6	6	5	5	4	4	3
22° 22′ – 23° 54′	9	8	8	7	7	6	6	5	5	4	4
23° 54′ – 25° 21′	9	9	8	8	7	7	6	6	5	5	4
25° 21′ – 26° 45′	10	9	9	8	8	7	7	6	6	5	5
26° 45′ – 28° 6′	10	10	9	9	8	8	7	7	6	6	5
28° 6′ – 29° 25′	11	10	10	9	9	8	8	7	7	6	6
29° 25′ – 30° 41′	11	11	10	10	9	9	8	8	7	7	6
30° 41′ – 31° 56′	12	11	11	10	10	9	9	8	8	7	7
31° 56′ – 33° 9′	12	12	11	11	10	10	9	9	8	8	7
33° 9′ – 34° 21′	13	12	12	11	11	10	10	9	9	8	8
34° 21′ – 35° 31′	13	13	12	12	11	11	10	10	9	9	8
35° 31′ – 36° 41′	14	13	13	12	12	11	11	10	10	9	9
36° 41′ – 37° 50′	14	14	13	13	12	12	11	11	10	10	9
37° 50′ – 38° 58′	15	14	14	13	13	12	12	11	11	10	10
38° 58′ – 40° 5′	15	15	14	14	13	13	12	12	11	11	10
40° 5′ – 41° 12′	16	15	15	14	14	13	13	12	12	11	11
41° 12′ – 42° 19′	16	16	15	15	14	14	13	13	12	12	11
42° 19′ – 43° 26′	17	16	16	15	15	14	14	13	13	12	12
43° 26′ – 44° 32′	17	17	16	16	15	15	14	14	13	13	12
44° 32′ – 45° 38′	18	17	17	16	16	15	15	14	14	13	13
45° 38′ – 46° 45′	18	18	17	17	16	16	15	15	14	14	13
46° 45′ – 47° 51′	19	18	18	17	17	16	16	15	15	14	14
47° 51′ – 48° 58′	19	19	18	18	17	17	16	16	15	15	14
48° 58′ – 50° 6′	20	19	19	18	18	17	17	16	16	15	15
50° 6′ – 51° 13′	20	20	19	19	18	18	17	17	16	16	15
51° 13′ – 52° 22′	21	20	20	19	19	18	18	17	17	16	16
52° 22′ – 53° 31′	21	21	20	20	19	19	18	18	17	17	16
53° 31′ – 54° 41′	22	21	21	20	20	19	19	18	18	17	17
54° 41′ – 55° 52′	22	22	21	21	20	20	19	19	18	18	17
55° 52′ – 57° 4′	23	22	22	21	21	20	20	19	19	18	18
57° 4′ – 58° 17′	23	23	22	22	21	21	20	20	19	19	18
58° 17′ – 59° 32′	24	23	23	22	22	21	21	20	20	19	19
59° 32′ – 60° 49′	24	24	23	23	22	22	21	21	20	20	19
60° 49′ – 62° 9′	25	24	24	23	23	22	22	21	21	20	20
62° 9′ – 63° 30′	25	25	24	24	23	23	22	22	21	21	20
63° 30′ – 64° 55′	26	25	25	24	24	23	23	22	22	21	21
64° 55′ – 66° 24′	26	26	25	25	24	24	23	23	22	22	21
66° 24′ – 67° 57′	27	26	26	25	25	24	24	23	23	22	22
67° 57′ – 69° 35′	27	27	26	26	25	25	24	24	23	23	22
69° 35′ – 71° 21′	28	27	27	26	26	25	25	24	24	23	23
71° 21′ – 73° 16′	28	28	27	27	26	26	25	25	24	24	23
73° 16′ – 75° 24′	29	28	28	27	27	26	26	25	25	24	24
75° 24′ – 77° 52′	29	29	28	28	27	27	26	26	25	25	24
77° 52′ – 80° 56′	30	29	29	28	28	27	27	26	26	25	25
80° 56′ – 85° 45′	30	30	29	29	28	28	27	27	26	26	25
85° 45′ – 90° 00′	31	30	30	29	29	28	28	27	27	26	26